Research Note

Rediscovery of a Caribbean living fossil: *Pholadomya candida* G.B. Sowerby I, 1823 (Bivalvia: Anomalodesmata: Pholadomyoidea)

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Pholadomya candida G.B. Sowerby I, 1823, is an anomalodesmatan bivalve belonging to the ancient family Pholadomyidae, a group of burrowing bivalves with a wide palaeobiogeographic distribution from the Carboniferous to the Recent (Cox, 1969). This group is characterized by having posteriorly elongated shells with strong radial ribbing, a siphonal gape, a hinge with no functional teeth, and an external opisthodetic ligament (Runnegar, 1974).

Although several recent species from different regions of the world have been described under *Pholadomya*, the type species, *P. candida*, is the only Recent species resembling a great number of fossil forms in size, shape, and life habits (Cox, 1969; Waterhouse, 1969; Lazo, 2007). Accordingly, all other extant members of the Pholadomyoidea are more correctly placed in the genera *Parilimya* Melvill and Standen, 1899 or *Panacea* Dall, 1905 (Cox, 1969; Runnegar, 1972; Zinsmeister, 1978; Morton, 1980; Lazo, 2007). It seems then that *P. candida* is the only remaining species of a genus that flourished for more than 200 million years from the Late Triassic to the Recent, and this is why Runnegar (1972, 1979) and Morton (1980) have referred to it as a "living fossil."

Records of *Pholadomya candida* are extremely scarce, mostly from the West Indies. Since living specimens had not been found since the latter part of the 19th Century, the species was considered as possibly extinct (Runnegar, 1972; Morton, 1980). However, discoveries of fresh-looking shells from Venezuela (Gibson-Smith and Gibson-Smith, 1980) and Colombia (Díaz and Borrero, 1995) provided evidence that it still may be living, at least in the southern Caribbean.

Pholadamya candida had been collected alive only twice, at least in the sense of being available for scientific studies (Morton, 1980); both specimens were found before 1842 in the same area, the Virgin Islands. One of them was dissected by R. Owen in 1839, but some of his illustrations were lost and his manuscript never published (Runnegar, 1972). The second specimen was dissected and the functional anatomy described by Morton (1980).

On November 2004, while diving at Bahía Concha, a sheltered bay near Santa Marta, on the Caribbean coast of Colombia (11°17′56″ N, 74°08′52″ W), a pair of openings on the sandy bottom at a depth of about of 4 m caught the attention of one of us (DCT). Excavating deeply around the holes, she exposed a large clam (about 20 cm long) bearing white, pearly valves that she hadn't seen before. The animal was photographed (Figure 1) and, not being the subject of her study, released on the bottom. Three years later, the photograph was shown to the first author, who immediately recognized the clam as *P. candida* since several years before he had discovered empty valves of this species in the same general area (Díaz and Borrero, 1995).

On January 26, 2008, two of us (JMD and FG) visited Bahía Concha in order to search for other living specimens of *P. candida*. After almost one hour diving along the shore, we detected a pair of openings slightly protruding from the sandy bottom at 3 m depth. These structures matched the size and shape of the apertures of the large, bifid siphonal tube of *P. candida* (Figure 2). Both apertures closed sphincter-like and retracted slightly into the sediment when we started to dig around them. Indeed, we dug out a specimen of the "living fossil," though not as large as the specimen found three years before. Unfortunately, the anterior part of both valves broke during collecting, but the entire soft parts of the animal were still present; the length of the valves was approximately 70 mm and the siphonal tube was 55 mm long. The specimen was preserved in 100% alcohol and deposited in the marine invertebrate collection at the Universidad de Los Andes in Bogotá (IM–Andes 559).

In regard to the mode of life of *P. candida*, the specimen was positioned nearly vertically in the bottom at a small angle, on its anteroventral margin. This observation agrees completely with the inferred life position of *P. gigantea*

Figure 1. Specimen of *Pholadomya candida* found on November 2004 in Bahia Concha, Colombia.

(J. de C. Sowerby in Fitton, 1836) from the Early Cretaceous of west-central Argentina by Lazo (2007: fig. 8). This author also stated (p. 385) that "in modern *P. candida* the shortness of the (ventral) inhalant siphon relative to the exhalant may not indicate that the animal lay on its back as suggested by Morton (1980: fig. 57). The longer siphon may function as a sort of tube or chimney to discharge waste water well-above the entrance of clean water at the inhalant siphon aperture." Therefore, it seems likely that *P. candida* has a suspension-feeding habit rather than a pedal-feeding system as postulated by Morton (1980) based on the presence of a pedal gape and accessory muscles. A suspension-feeding habit has been commonly suggested in Jurassic and Cretaceous *Pholadomya* species as well (references in Lazo, 2007). The habitat of *P. candida*, at least in Bahía Concha, also suggests a suspension-feeding

Figure 2. Close-up view (from above) of the openings of the siphonal tube of *Pholadomya candida* protruding from the bottom surface.

mode of life. The habitat here is characterized by coarse grain sediments in a shallow setting adjacent to the beach, where water motion caused by incoming waves and drift current is clearly perceptible. This is not the appropriate environment for accumulation of enough detritus on the bottom to guarantee the alimentary requirements of a relatively large, almost sessile, deposit feeder.

The present record is definitive evidence that *Pholadomya candida* is not extinct. Moreover, the specimen collected makes it now possible to undertake genetic sequencing of the only modern representative of an ancient lineage. Comparative molecular sequencing of *P. candida* with other anomalodesmatan species and representatives of additional, presumably related groups may provide not only an insight into the evolution of the other widely differing superfamilies of the Anomalodesmata, but might also reveal clues as to the origin of the Myoida.

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